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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/641,589	08/18/2000	Philip A. Cooper	11910-002001	6655

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EXAMINER
BORLINGHAUS, JASON M

ART UNIT	PAPER NUMBER
3628	

DATE MAILED: 04/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

<table>
<tr><td rowspan="2">Office Action Summary</td><td>Application No.</td><td>Applicant(s)</td></tr>
<tr><td>09/641,589</td><td>COOPER ET AL.</td></tr>
<tr><td></td><td>Examiner</td><td>Art Unit</td></tr>
<tr><td></td><td>Jason M. Borlinghaus</td><td>3628</td></tr>
</table>

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>02 February 2006</u>.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 8-10* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 8-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: enclosure of

appendix is improper. An appendix is limited to enclosure of a sequence listing table or

a computer program listing (see MPEP § 608.05). Otherwise, information contained

within the appendix should be incorporated into the specification or filed through an IDS.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

Claim 1 - 3 and 8 - 10 are rejected under 35 U.S.C. 112, second paragraph, as

being indefinite for failing to particularly point out and distinctly claim the subject matter

which applicant regards as the invention.

Claim 1 (lines 7 – 8) claims "computations including ... a shift in the mean of the

first probability distribution to obtain a second probability distribution." However, "a shift"

is not a computation, but a result of a computation.

Claims 1 (lines 10 – 11) and 9 (lines 19 – 20) claims "making

information...available within a time frame that is useful to investors." Such

measurement of a time frame is indefinite in size and scope.

Claim 8 (lines 3 – 4) claims "the second time is sufficiently soon after the first

time that any shifting of the variables that affect option prices is small." Such

measurement of a time frame, either via a unit of time or unit of variable change, is

indefinite in size and scope.

Dependent claims are rejected based upon dependency of rejected claims.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

  1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

To ensure clarity and clear understanding of examiner's rationale for application

of cited prior art references terminology contained within parentheses indicates quoted

language contained within or general concepts conveyed by said cited prior art

references. Such parenthetical terminology is to be interpreted as "reading on" or being

"mapped to" the claim language prior to such parenthetical inclusions.

Claims 1 - 3 and 9 - 10 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Disclosed Prior Art (applicant's specification and appendix) in view of

Makridakis (Makridakis, Spyros; Wheelwright, Steven C; Hyndman, Rob J. *Forecasting*

Methods & Applications. 3rd Edition. John Wiley & Sons. Danvers, MA. 1998. pp 13 – 16

and 82), Jackwerth (Jackwerth, Jens Carsten & Rubenstein, Mark. *Recovering*

Probability Distributions from Option Prices. The Journal of Finance. vol. LI, no. 5.

December 1996. pp. 1611 – 1631) and Wadsworth (Wadsworth, Harrison M. *The*

Handbook of Statistical Methods For Engineers & Scientists. 2nd Edition. McGraw-Hill.

New York, NY. pp. 6.1 – 6.3).

Regarding Claim 1, Disclosed Prior Art discloses a method comprising:

- receiving data representing current prices of options on an asset, the

  options being associated with different strike prices of the asset at a future

  time. (see specification, p. 1, lines 6 – 10);

- performing computations ("taking the second derivative of a continuous

  price curve") to derive from the data ("option prices" conveyed via a "price

  curve") an estimate ("probability density function") corresponding to a price

  or prices of the asset at a future time (expiration date). (see Appendix A,

  pp. 1 – 2); and

- an operation ("second derivative") on a result of the data ("option prices"

  conveyed via a "price curve") to obtain a first probability function

  ("probability density function"). (see Appendix A, pp. 1 – 2).

Disclosed Prior Art does not teach underlined limitations - a <u>machine-based</u> method comprising:

- <u>by machine</u>, performing computations to derive from said data an estimate of a corresponding to a price or prices of the asset at a future time;

- <u>the computations including a smoothing operation performed in a volatility domain</u>, an operation <u>on a result of the smoothing</u> to obtain a first probability distribution, <u>and a shift in a mean of the first probability distribution to obtain a second distribution</u>;

- <u>making information about the second probability distribution available within a time frame useful to investors.</u>

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have automated the method, since it has been held that broadly providing a mechanical or automatic means to replace manual activity that accomplishes the same result involves only routine skill in the art. *In re Venner*, 120 USPQ 192.

Utilization of smoothing functions to smooth data and/or models to account for possible noise, fluctuations and/or outliers contained within underlying data is old and well known in the art of statistical analysis and development of mathematical models, as evidenced by Makridakis (see p. 82). Furthermore, the desire to maximize smoothness in probability distributions created from option prices is also old and well known in the art of statistical analysis and development of mathematical models, as evidenced by Jackwerth (see abstract). Therefore, it would have been obvious to one of ordinary skill

in the art at the time the invention was made to have modified Disclosed Prior Art by

utilizing a smoothing operation upon the data, as disclosed by Makridakis, to account for

volatility in said data, prior to further processing of said data, ensuring that possible

volatility fluctuations were addressed prior to further computations, producing the much

desired smooth probability distribution, as disclosed by Jackwerth, enhancing its

predictive value.

Development of a statistical model for forecasting purposes and the standard

methodology employed for the development of said model is old and well known in the

art of statistical analysis and the development of mathematical models, as evidenced by

Makridakis (see pp. 13 – 16). Such methodology consists of the following steps:

(1) collecting data;

(2) matching said data to an existing model;

(3) shaping and/or fitting said model to account for data, such as through shifting

of parameters, as evidenced by Wadsworth (see pp. 6.1 – 6.3);

(4) forecasting based upon said model;

(5) evaluating model accuracy; and

(6) return to step (3) for further adjustment and/or refinement of said model.

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to have modified Disclosed Prior Art, Makridakis and

Jackwerth by incorporating the fitting and/or shaping of said probability distribution on

the basis of additional data, as disclosed by Makridakis, allowing for the continual

refinement and correction of said model on the basis of new incoming data.

Additionally, as Disclosed Prior Art discloses "***In the real world***, the price s of the underlying asset changes with time, and there will be a corresponding change in option prices." (emphasis added). (see specification, p. 12, lines 6 – 8). It would have been obvious to one of ordinary skill at the time the invention was made to have modified Disclosed Prior Art, Makridakis and Jackwerth by incorporating a shifting of parameters, as disclosed by Wadsworth, such as the mean, to account for changes in incoming data, as disclosed by Disclosed Prior Art, and as a general component of the model development process.

Timely delivery of data to a user is old and well known in the art of information technology and decision-making. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Disclosed Prior Art, Makridakis, Jackwerth and Wadsworth by incorporating the ability to make the information from the calculations and computations available in a time frame that is useful for investors, allowing the investors to actually utilize the information derived from said calculations and computations.

Regarding Claim 2, Disclosed Prior Art discloses a method in which:

- data represent a finite number of prices of options at spaced-apart ("within certain price ranges and only for certain price intervals") strike prices of the asset. (see specification, p. 9, lines 16 – 21); and

- the operation ("second derivative") to obtain a first probability distribution ("pdf"). (see Appendix A, pp. 1 – 2).

Disclosed Prior Art does not teach underlined limitations - a method in which:

- the operation to obtain a first probability distribution <u>comprises a set of first</u>

  <u>differences of said finite number of prices to form an estimate of the</u>

  <u>cumulative probability distribution of the price of the asset at a future time.</u>

Jackwerth discloses a method in which

- data represent a finite number of option prices ("observed option prices")

  at spaced-apart ("discretely spaced") strike prices of the asset. (see p.

  1620); and

- the operation ("second derivative") to obtain a first probability distribution

  ("probability distribution"). (see pp. 1619 – 1621) comprises a set of first

  differences ("first derivative") of said finite prices to form an estimate of the

  cumulative probability function (see Fig. 3) of the price of the asset (see

  pp. 1620-1621).

It would have been obvious to one of ordinary skill in the art to at the time to the

invention was made to have modified Disclosed Prior Art, Makridakis, Jackwerth and

Wadsworth by incorporating the cumulative probability function, as disclosed by

Jackwerth, to provide the user with a cumulative probability distribution, as formulation

of the cumulative probability distribution is an intermediate step in formulation of final

product, a probability density function, as disclosed by Disclosed Prior Art.

Regarding Claim 3, Disclosed Prior Art discloses a method in which:

- obtaining a second probability comprises calculating a set of second

  differences ("second derivative") of the finite number of strike prices from

  the set of first differences (first derivative, presence of a first derivative in

the computation of a second derivative) to form an estimate of the

probability distribution function ("pdf") of the price of said asset at a future

time. (see Appendix, pp. 1 - 2).

Regarding Claims 9 - 10, Claims 9 - 10 recite similar limitations to Claim 1 and

are therefore rejected using the same art and rationale as applied in the rejection of

Claim 1.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Disclosed

Prior Art.

Regarding Claim 8, Disclosed Prior Art discloses a method comprising:

- receiving data representing prices of options on a given asset at a first

  time, the options being associated with spaced-apart strike prices of the

  asset at a future time. (see specification, p. 1, lines 6 – 10); and

- performing computations ("second derivative") to derive from said data an

  estimate of a quantized implied probability distribution ("pdf") of the price

  of said asset at a future time. (see Appendix A, pp. 1 - 2).

Disclosed Prior Art does not teach underlined limitations a method comprising:

- the data also representing prices of options at a second time, in which an

  underlying price of the asset at the second time is shifted from an

  underlying price of the asset at the first time, and the second time is

  sufficiently soon after the first time that any shifting of other variables that

  affect option prices is small;

- estimating, based on the prices of the options at the second time, prices of options at the first time;

- by machine, performing computations to derive from said data an estimate of a quantized implied probability distribution of the price of said asset at a future time, the quantized implied probability distribution corresponding to both the prices of options at the first time and the prices of options at the first time estimated from the observations at the second time.

Receipt of updated financial data revealing potential of changes in the underlying financial information is old and well known in the art of information technology and financial markets, as evidenced by Disclosed Prior Art (see specification, p. 12, lines 6 – 8). Furthermore, receipt of updated financial data in real-time, near-real-time and/or small time intervals is old and well known in the art of information technology. It would have obvious to one of ordinary skill in the art at the time the invention was made to have modified Disclosed Prior Art by incorporating the receipt of data at multiple times at small time intervals, reporting changes in the data, allowing for the constant receipt of incoming data to be modeled by the probability distribution.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have automated the method, since it has been held that broadly providing a mechanical or automatic means to replace manual activity that accomplishes the same result involves only routine skill in the art. *In re Venner*, 120 USPQ 192.

Development of a statistical model for forecasting purposes and the standard

methodology employed for the development of said model is old and well known in the

art of statistical analysis and the development of mathematical models, as evidenced by

Makridakis (see pp. 13 – 16). Such methodology consists of the following steps:

(1) collecting data;

(2) matching said data to an existing model;

(3) shaping and/or fitting said model to account for data;

(4) forecasting based upon said model;

(5) evaluating model accuracy; and

(6) return to step (3) for further adjustment and/or refinement of said model.

Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to have modified Disclosed Prior Art and Makridakis by

incorporating the fitting and/or shaping of said probability distribution on the basis of

additional data, as disclosed by Makridakis, allowing for the continual refinement and

correction of said model on the basis of new incoming data.

Response to Arguments

Applicant's arguments with respect to pending claims have been considered but

are moot in view of the new ground(s) of rejection. Arguments concerning hindsight and

obviousness, in general, contained within arguments filed on 2/2/06 will be addressed

below.

In response to applicant's argument concerning impermissible hindsight, examiner asserts that "[a]ny judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill at the time claimed invention was made and does not include knowledge gleaned only from applicant's disclosure, reconstruction is proper." In re McLaughlin, 170 USPQ 209, 212 (CCPA 1971).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Therefore, even if the references in the instant case do not expressly suggest the specific combination claimed by the inventor, the courts have been satisfied when an examiner "present[s a] convincing line of reasoning as to why artisan would have found claimed invention to have been obvious in light of references' teachings." Ex parte Clapp, 227 USPQ 972, 973 (BdPatApp&Int 1985).

Furthermore, applicant's argument in support of applicant's contention that combination of prior art methods is non-obvious based upon the fact that the examiner has "not produced any other references combining, or [explicitly] suggesting combining" said prior art methods, despite the value of such a output of said combination, is faulty

as production of such prior art references is not the employed standard. (see Applicant's

Arguments filed on 2/2/2006, p. 5 of 8). Applicant's contention that "[i]f the claimed

methods were obvious, others would have been practicing it," is erroneous for the same

reason. (see Applicant's Arguments filed on 2/2/2006, p. 5 of 8).

Conclusion

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Jason M. Borlinghaus whose telephone number is (703)

308-9552. The examiner can normally be reached on 8:30am-5:00pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Hyung Sough can be reached on (703) 308-0505. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

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Business Center (EBC) at 866-217-9197 (toll-free).

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